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Germination Of `Klabi` Apricot Seeds As Affected By Gibberellic Acid Thiourea And Promalin

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ABSTRACT

Three experiments were conducted in February, May and August 1987 to investigate the effect of different concentrations of Gibberellic acid (2000, 3000 and 4000 ppm) , Thiourea (5000, 10000 and 20000 ppm) and Promalin (100, 500 and 2500 ppm) on germination of nonstratified seeds with intact endocarp of the apricot Prunus armeniaca L. cv. Klabi.

In February experiment, GA3 or Promalin did not result in any significant increase in germination percentage of apricot seeds, while in May and August GA3 and Promalin increased germination percentage of `Klabi` seeds, but not always significantly. There was- in most cases- no significant concentration effect of rate of GA3 or Promalin on germination percentage.

Thiourea concentrations especially the 10000 and 20000 ppm gave the lowest germination percentage. This effect was more pronounced with the later planting date.

Key words : Prunus armeniaca, Germination, GA3 , Promalin, Thiourea.

INTRODUCTION

The apricot is usually propagated by budding or grafting the desired scion cultivar on apricot, peach or plum rootstock.

Under natural conditions apricot, peach, cherry and plum seeds require a certain period of after-ripening before being able to germinate. Length of the after-ripening period might range from few weeks to few months (Folge, 1968; Chao and Walker, 1966; El-Tomi et al., 1978). Therefore, reducing or substituting the period of after ripening has been a major concern of researchers and nurserymen. Methods such as stratification (Chao and Walker, 1966; Mathur et al., 1971, Bonamy and Dennis 1977), scarification (Pillay et al., 1965), dipping in growth regulator solutions (Pillay and Edgerton, 1965; Abohassan et al., 1979; El-Tomi et al., 1978; Rouskas et al.,1980), or combination of two or more techniques (Bajwa et al., 1980) were used for this purpose .

In Jordan and in other middle east countries , seeds of the apricot cultivar Klabi are widley used to produce seedling rootstocks for further utilization in grafting or budding operations. Research conducted in 1983 and 1984 in Jordan , indicated that the use of GA3 or Promalin (GA4&7+ Cytokinin) resulted in enhanced and higher germination rates of `klabi` seeds with intact endocarp (Shatat 1986).

The present work has been conducted during

1987 to investigate whether the use of GA3 Thiourea and Promalin concentrations other than those used previously (Shatat, 1986) could further improve germination of `Klabi` seeds.

MATERIALS AND METHODS

Three experiments were conducted in February, May and August in 1987 to investigate the effect of GA3, Thiourea and Promalin upon the germination of nonstratified seeds with intact endocarp of the apricot cultivar Klabi. Each of the three experiments consisted of the following treatments: 1- control (water soaking); 2- GA3 2000 ppm, 3-GA3 3000 ppm, 4- GA3 4000 ppm, 5-Thiourea 5000 ppm 6 - thiourea 10000 ppm, 7-Thiourea 20000 ppm, 8- Promalin 100 ppm, 9- Promalin 500 ppm, and 10- Promalin 2500 ppm.

Forty seed for each treatment were soaked for 24 hours in the assigned solution then planted in perforated metal trays filled with a sterilized 1:4 peatmoss / soil mix. After planting, the trays, were placed in a greenhouse and kept moist by watering whenever needed.

Germination records were taken daily starting when the first germination occurred. Dates of planting, occurrance of first germination and termination of each experiment are shown in Table 1.

Percent germination was calculated using the following formula :

Table 1. Planting date, first germination and experiment termination date of `Klabi` apricot seeds in 1987.

Experiment Planting Termination	date	First germination
February 6/4/87	18/2/87	7/3/87
May 11/6/87	12/5/87	23/5/87
August 31/8/87	2/8/87	12/8/87

$$\frac{\text{Number germinated seeds} \times 100}{\text{Number planted seeds}}$$

Analysis of variance for a randomized complete block design was applied for statistical analysis. Duncan`s Multiple Range Test was used for mean separation.

RESULTS

February experiment :

After 17 days following planting, the 4000 ppm GA3 treatment gave the highest and 10000 and 20000 ppm Thiourea treatments gave the lowest germination percentage (Table 2).

Germination results for the 4000 ppm GA3 treatment did not differ significantly from those for the control, 2000 and 3000 ppm GA3 treatments and 500 or 2000 ppm promalin treatments. There were no significant differences among all GA3 or all Promalin or all Thiourea treatments (Table 2).

Germination results for all Thiourea concentrations, the 3000 ppm GA3 and 100 ppm promalin treatments did not differ significantly from each other (Table 2). After 27 days from planting the highest germination percentage was recorded for the control and the lowest for 20000 ppm Thiourea treatment. There were no significant differences in germination between the control and the GA3 or Promalin treatments (Table 2). which in turn did not differ significantly from germination results of seeds soaked in either 5000 or 10000 ppm Thiourea (Table2).

After 37 days from planting, most of the treatments did not show any change in the germination percentage compared to that obtained after 27 days. Only the 3000 ppm GA3, 5000 ppm Thiourea and 2500 ppm Promalin treatments showed slight increase in germination (Table 2).

May experiment

After 19 days from planting the highest germination percentage was obtained from the 500 ppm Promalin treatment, which did not differ significantly from the control, GA3 treatments and

Table 2. Effect of GA3, Thiourea and Promalin on germination of seeds of the `Klabi` apricot in February 1987.

Treatment	Days following treatment		
	17	27	37
	Germination (%)*		
control (water soaking)	38 abc	63 a	63 a
GA3 2000 ppm	48 ab	58 ab	58 ab
3000 ppm	33 abcd	53 ab	58 ab
4000 ppm	53 a	60 ab	60 ab
Thiourea 5000 ppm	15 cd	33 bc	38 abc
10000 ppm	13 d	33 bc	33 bc
20000 ppm	13 d	18 c	18 c
Promalin 100 ppm	28 bcd	43 abc	43 abc
500 ppm	40 ab	53 ab	53 ab
2500 ppm	40 ab	60 ab	63 a

* Means within each column followed by the same letter, are not significantly different by Duncan`s Multiple Range Test, 5% level.

2500 ppm Promalin treatment (Table 3). Thiourea (10000 ppm and 20000 ppm) treatments gave the lowest germination percentage. All Thiourea

treatments and the 100 ppm Promalin treatment gave significantly lower germination results than the 500 ppm Promalin treatment (Table 3) .

Table 3. Effect of GA3 , Thiourea and Promalin on germination of seeds of the `Klabi` apricot in May 1987.

Treatment		Days after planting	
		19	29
		Germinatin(%)*	
Control (Water soaking)		30 abc	35 abc
GA3	2000 ppm	30 abc	33 abc
	3000 ppm	40 ab	50 ab
	4000 ppm	35 abc	45 abc
Thiourea	5000 ppm	20 bc	38 abc
	1000 ppm	13 c	23 c
	2000 ppm	13 c	28 bc
Promalin	100 ppm	20 bc	33 abc
	500 ppm	48 a	53 a
	2500 ppm	40 ab	45 abc

* Means within each column followed by the same letter, are not significantly different by Duncan`s Multiple Range Test, 5% level.

Twenty nine days following planting the 500 ppm Promalin treatment was still leading. Next to it came the 3000 ppm GA3 treatment (Table 3). Lowest

germination percentage was obtained from the Thiourea 1000 and 20000 ppm treatments, which were significantly lower than the 500 ppm Promalin treatment (Table 3). No significant differences were evident between the control and each of the Promalin or GA3 or Thiourea treatments (Table 3).

August experiment :

Nineteen days after planting, the 2500 ppm Promalin treatment gave the significantly highest germination percentage compared to the control (Table 4). Seeds treated with 10000 or 20000 ppm Thiourea did not germinate. All GA3 treatments, the Promalin 100 and 500 ppm treatments and the 5000 ppm Thiourea treatment gave higher germination results than the control but not always significant (Table 4).

After 29 days from planting, little or no change has been noticed in the germination percentage of the different treatments.Highest germination was recorded for 2500 ppm Promalin and the lowest for the control, Thiourea at 10000 and 20000 ppm treatments, respectively (Table 4).

DISCUSSION

The results indicate a sharp drop in the ability of untreated `Klabi` apricot seeds to germinate with advanced season (35 and 8% germination for May and August compared to 63% for February). It appears that `Klabi` seeds undergo a marked loss in viability with advanced season . GA3 or Promalin could, to

Table 4. Effect of GA3, Thiourea and Promalin on germination of seeds of the `Klabi` apricot in August 1987.

Treatment	Days after planting	
	19	29
	Germination (%)*	
Control (water soaking)	80 cd	8 cd
GA3 2000 ppm	23 abc	28 abc
3000 ppm	20 abcd	23 abcd
4000 ppm	30 ab	30 ab
Thiourea 5000 ppm	18 abcd	20 abcd
1000 ppm	0 d	5 d
2000 ppm	0 d	3 d
Promalin 100 ppm	18 abcd	20 abcd
500 ppm	15 bcd	15 bcd

* Means within each column followed by the same letter, are not significantly different by Duncan`s Multiple Range Test, 5% level.

some extent, substitute for this loss of viability as indicated by the higher germination results obtained from GA3 or Promalin treated seeds in May and August experiments compared to the control.

Gibberellic acid has been reported to play a key role in the process of seed germination of many fruit

tree species. (Khan, 1971; Mathur et al., 1971). Gibberrellic acid is believed to act at the early stage of enzyme induction and later on through the activation of enzymes participating in the food mobilizing system of germinating seeds (Hartmann and Kester, 1983).

The positive effect of Promalin compared to the control in improving germination of `Klabi` seeds with advanced season (May and August), could be mainly due to the Gibberellin components (GA4 &7) of this material.The question whether these forms of GA affect germination of `Klabi` seeds directly or after being converted to other GA forms remains open. A conversion of GA7 to GA3 during termination of peach seeds has been reported by Mathur et al.. (1971).

The Kinetin component of Promalin did not show any pronounced effect on germination of `Klabi` seeds. since germination percentage for all Promalin treatments did not differ significantly from those for GA3 alone. Davies (1983) reported 6-Benzylamino purine (BAP) to have no effect in overcoming dormancy of `Nemaguard` peach seeds. These findings disagree with those obtained by Abohassan et al (1979) and Rouskas et al (1980).

Abohassan et al. (1979) found kinetin at 5 or 10 ppm to enhance germination of scarified apricot seeds. Similarly Roukas et al. (1980), found that a 24 hour soak of seeds with intact coat of the INRA GF 305 hybrid in BA 200 mg/litre, or in a combination of GA3+BA 100 mg/litre or GA4 & 7 + BA

100 mg/ litre, reduced the time required for germination drastically compared to the control.

Among the Thiourea treatments, only the lowest concentration (5000 ppm) seemed to have a more or less positive effect upon germination of `Klabi` seeds. The other two concentrations(10000 and 20000 ppm) either reduced or inhibited germination. Hartmann and kester(1983) reported Thiourea to be inhibitory to growth, while Erez (1978) reported Thiourea to show a cytokinin like activity in seed germination.

CONCLUSION

1- The ability of `Klabi` apricot seeds to germinate, decreased with advanced season (February through August).
2- GA3 or Promalin can be used to enhance and improve germination of `Klabi` seeds
3- Thiourea concentrations above 5000 ppm should not be used for treating `Klabi` seeds.

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شتات ، فهمى . ١٩٨٦ . تأثير كل من البرومالين وحامض الجبريليك والثيويوريا فى انبات بذور المشمش من الصنف " كلابى" . دراسات (العلوم الزراعية). المجلد ١٣: ٩٥-١٠٥ .

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تأثير حامض الجبريلين ، والثيويوريا البرومالين على انبات بذور المشمش صنف "كلابى"

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ملخص

اجريت ثلاث تجارب في شباط . ايار وآب من عام ١٩٨٧ لدراسة مدى تأثير تراكيز مختلفة من حامض الجبرلين (٢٠٠٠ ، ٣٠٠٠ و ٤٠٠٠ جزء بالمليون) والثيويوريا (٥٠٠٠ ، ١٠٠٠٠ و ٢٠٠٠٠ جزء بالمليون) والبرومالين (١٠٠ ، ٥٠٠ و ٢٥٠٠ جزء بالمليون) ، على انبات بذور مشمش غير منضده وبغلافها الصلب من الصنف " كلابي".

لم يؤد استعمال كل من حامض الجبرلين والبرومالين الى زيادة نسبة الانبات في تجربة شباط . في حين ادى استعمال هاتين المادتين في أيار وآب الى زيادة نسبة الانبات ، علما بان الزيادة لم تكن دائما معنوية . ولم يكن هنالك فروق معنوية بين نتائج التراكيز المختلفة لهاتين المادتين في غالب الاحيان .

ادى استعمال الثيويوريا الى تقليل نسبة الانبات خاصة عند استعمال التراكيز العالية ١٠٠٠٠ و ٢٠٠٠٠ جزء بالمليون . وكان هذا التاثير اكثر وضوحا كلما تأخر موعد زراعة البذور .

كلمات مفتاحيه : المشمش ، انبات البذور ، الجبرلين ، البرومالين ، الثيويوريا